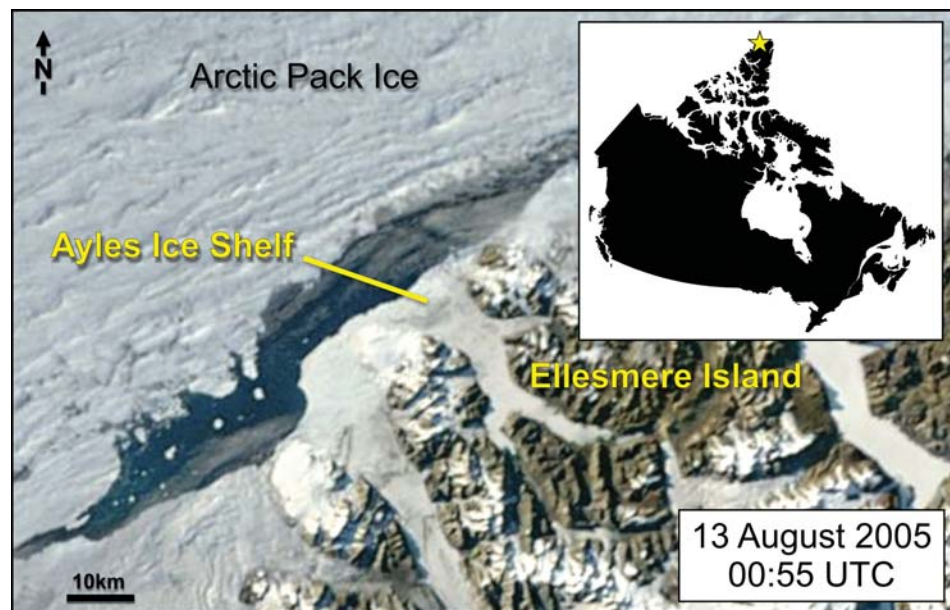


## Break-up and Ecosystem Loss at Canada's Northern Coast

From 2004 onwards, under the auspices of ArcticNet, we have been undertaking climate-related observations at the northern coastline of Ellesmere Island, Nunavut. The operations are based each year out of Ward Hunt Island Observatory (WHIO), our base camp located at latitude 83°N at the northern limit of Quttinirpaaq ('Top of the World' in Inuktitut) National Park. One of our first steps was to establish, in partnership with Parks Canada, a 10 m tall automated climate station, the northernmost station in the Canadian Arctic. Given the remote location of this site (2180 km north of Iqaluit), it took two years to put all the equipment in place and we downloaded our first annual data set from the WHIO station in June 2006. It turned out to be an important record for an eventful year.

In early 2006, we became aware of the Canadian Ice Service observation that there had been a major ice loss along this northern coastline, with break-out of the Ayles Ice Shelf. Derek Mueller worked closely with Luke Copland (University of Ottawa) and Laurie Weir (Canadian Ice Service) to put together the sequence of events based on remote sensing and climate data, and we adjusted our field schedule to visit this site as part of our 2006 ArcticNet expedition to WHIO. We presented our field observations to participants at the 2006 ArcticNet Annual Scientific Meeting, which led to intense media interest, culminating in news items in major newspapers around the world, many TV and radio reports, a news item and ArcticNet photo of the newly formed Ayles Ice Island in Science (January 19, 2007), and current reports on some 50,000 websites.

The Ayles Ice Shelf was one of six remaining ice shelves in the Canadian High Arctic. It likely formed several thousand years ago as part of a larger ice shelf, which in the early 1900s extended 400 km along the Ellesmere coastline. These ice shelves were greatly



*The Ayles Ice Shelf broke away from the coast of Ellesmere Island, NU on August 13, 2005 (Images courtesy of NASA). A GPS beacon was installed on the ice shelf in May 2007 and movement can be observed on the Canadian Ice Service website ([ice-glaces.ec.gc.ca](http://ice-glaces.ec.gc.ca)).*

reduced during a warm period in the 1930-40s and further losses occurred in the 1960s, leaving only 10 percent of this feature that the early 20th century explorer Robert Peary had referred to as Ellesmere Island's "glacial fringe". The Ayles Ice Shelf was also substantially changed in the 1960s when it detached and floated northwards some 4 km out of Ayles Fiord. However, the ice shelf

remained cemented in place as a 'loose tooth' for the intervening four decades. In recent years, with increasingly warm annual temperatures, we have observed that conspicuous changes are occurring in many of the ice-dependent ecosystems of this region.

The Ayles Ice Shelf broke away from the coast of Ellesmere Island within a

one-hour period on the afternoon of August 13, 2005. This dramatic event occurred after a summer of anomalously warm air temperatures and a period of off- and along-shore wind (recorded at WHIO) that pushed the Arctic Ocean sea ice away from the coast and allowed the detached ice island to move off to the west. The ice island is currently more than 50 km away from its original position in Ayles Fiord and continues to drift to the southwest. In May 2007, Derek Mueller and Luke Copland landed by twin otter on Ayles Ice Island with a BBC film crew. They installed a tracking beacon on the island and from ground-penetrating radar measurements estimated a current ice thickness of 42-45 m. This means that the total mass of the ice island is more than two billion tonnes.

Our water column profiling in Ayles Fiord also showed that the epishelf lake (a body of mostly freshwater trapped behind an ice shelf) had been completely lost as the surface layer drained away, no longer retained by the thick ice shelf and multiyear sea ice. The break-up of ice in

the Ayles Fiord region follows another major event just three years earlier in which the Ward Hunt Ice Shelf fractured in half, draining the largest epishelf lake in the Northern Hemisphere. These lake ecosystems contained a unique mixture of marine and freshwater zooplankton. The ice shelves themselves are also living ecosystems that contain a rich biodiversity of microscopic species. These environments and their biota, like the other remarkable, ice-dependent aquatic habitats of northern Nunavut, are endangered ecosystems and highly vulnerable to the ongoing effects of a warming climate.

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*The Ayles Ice Shelf as observed on May 30, 2006 during a visit to WHIO (Photo: Warwick Vincent).*

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## In Memoriam – Prof. Grant Ingram

ArcticNet and the ocean science community lost a great man and valued scientist with the passing of Prof. Grant Ingram on June 13, 2007. Early in his career, Grant taught and developed an interdisciplinary research program in oceanography at McGill University, becoming a Professor in the Department of Atmospheric and Oceanic Sciences. He was a key member of the Groupe Interuniversitaire de Recherches Oceanographiques du Québec (GIROQ) for twenty five years, serving as President for the period 1992-97. In 1997, he moved to the University of British Columbia where he was the founding Principal of St. John's College, an academic graduate residential college for graduate students and scholars, from 1997 to 2004.

As a Professor in Earth and Ocean Sciences, his research interests included the physical processes and influence of climate change on biological-physical interactions in Arctic coastal waters. Grant was an active investigator in many of the large Canadian-led international initiatives to understand the rapidly changing Canadian Arctic, including SARES, NOW, CASES and ArcticNet. Respected for his considerable expertise and leadership in the study of physical oceanography of the Arctic, he brought to science a refreshing perspective of the interconnections of the physical and biological worlds. A Fellow of the Oceanography Society (TOS), he was recently conferred the title of "Fellow of the Society" by the Canadian Meteorological and Oceanographic Society (CMOS) "for his leadership in linking physical and biological oceanography, and his wide-ranging service and research contributions to Arctic oceanography."

Throughout his career, Grant was an avid mentor of young people. As one of the first scientific mentors for the ArcticNet Schools on Board program, he motivated and informed students about Arctic system science and was responsible for much of the success of the program and its impact on students and researchers alike.

Our heartfelt sympathies go to Grant's family and to the many students and colleagues whose lives he touched.